ASYMPTOTIC GIANT BRANCH STARS AND THEIR INFLUENCE ON THE ISOTOPIC COMPOSITIONS OF THE TRANSITION ELEMENTS. A. M. Davis[1], R. Gallino[2], S. Cristallo[3], and O. Straniero[3]. [1]Department of the Geophysical Sciences, Enrico Fermi Institute, University of Chicago, Chicago, IL 60637, USA. E-mail: a-davis@uchicago.edu. [2]Dipartimento di Fisica Generale, Universitá di Torino, 10125 Torino, Italy. [3]INAF-Osservatorio Astronomico di Collurania, 64100 Teramo, Italy.

The great majority (~90%) of presolar SiC grains likely come from low mass (~2 $M_\odot$) asymptotic giant branch (AGB) stars, the site of *s*-process nucleosynthesis. Progressive leaching experiments on carbonaceous chondrites have revealed *s*-process signatures, due to the chemical resistance of SiC [e.g., 1, 2]. With the increasing interest in nucleosynthetic anomalies in the transition elements in bulk meteorites and in leachates of primitive meteorites [e.g., 3–5], as well as in individual presolar SiC grains [6] we examine the predictions of AGB star models for these elements.

The envelope of an AGB star of initially solar composition has C<O in the early stages and condenses silicates and oxides. With repeated thermal pulses with dredge-up from the He intershell, the envelope becomes enriched in carbon and *s*-process isotopes. Once the C/O > 1, graphite and carbides begin to condense in stellar winds. In order to compare calculations with leaching residues from meteorites, we constructed a weighted average isotopic composition of graphite and carbides condensing from the envelope, weighting each pulse with C>O by the amount of mass loss following each pulse. This average is dominated by the last pulse with dredge-up, after which about half of the envelope is eventually lost through stellar winds. Isotopic compositions predicted for average graphite and carbides condensed from an AGB star of 2 $M_\odot$ and initial solar metallicity follow (with cross sections mostly slightly updated from [7], but with important changes for Ni, Cu and Ge): (1) $\delta(^{46}Ti/^{48}Ti)$= 36‰, $\delta^{47}Ti$= 8‰, $\delta^{49}Ti$=96‰, and $\delta^{50}Ti$=168‰; (2) $\delta(^{50}Cr/^{52}Cr)$ =–18‰, $\delta^{53}Cr$=1‰, and $\delta^{54}Cr$= 72‰; (3) $\delta(^{54}Fe/^{56}Fe)$=–4‰, $\delta^{57}Fe$= 54‰, $\delta^{58}Fe$=282‰, and $^{60}Fe/^{56}Fe$= 2.8×10^{-6}; (4) $\delta(^{60}Ni/^{58}Ni)$=17‰, $\delta^{61}Ni$=142‰, $\delta^{62}Ni$= 59‰, and $\delta^{64}Ni$=450‰; (5) $\delta(^{65}Cu/^{63}Cu)$=521‰; (6) $\delta(^{66}Zn/^{64}Zn)$=270‰, $\delta^{67}Zn$=430‰, $\delta^{68}Zn$=564‰, and $\delta^{70}Zn$=–13‰; (7) $\delta(^{71}Ga/^{69}Ga)$=355‰; (8) $\delta(^{72}Ge/^{70}Ge)$=94‰ $\delta^{73}Ge$= 40‰ $\delta^{74}Ge$=109‰, and $\delta^{76}Ge$=–640 ‰. All *s*-only isotopes below A=90 are dominated by production in the preexplosion evolution of massive stars, but a number of isotopes, including ^{58}Fe, ^{64}Ni, ^{65}Cu, $^{66,67,68}Zn$, $^{69,71}Ga$, and $^{70,72,73,74}Ge$, have some production in AGB stars. Progressing through the sequence of elements listed above, there is increasing overproduction of *s*-process isotopes, but even with $^{70,72,73,74}Ge$, only half as much overproduction in AGB stars as is typical for *s*-only isotopes of mainly AGB parentage such as ^{96}Mo and ^{134}Ba.

The largest predicted anomalies in Fe and Ni are in ^{58}Fe and ^{64}Ni, isotopes that are often ignored because of low abundances and isobaric interferences. It is of great importance to measure all isotopes to fully understand nucleosynthetic histories.

References: [1] Reisberg L. et al. 2009. *Earth and Planetary Science Letters* 277:334–344. [2] Dauphas N. et al. 2004. *Earth and Planetary Science Letters* 226:465–475. [3] Dauphas N. et al. 2008. *The Astrophysical Journal* 686:560–569. [4] Rotaru M. et al. 1992. *Nature* 358:465–470. [5] Qin L. et al. 2009. *Lunar and Planetary Science* 40:#1672. [6] Marhas K. K. et al. 2008. *The Astrophysical Journal* 689, 622–645. [7] Lugaro M. et al. 2003. *The Astrophysical Journal* 593:486–508.